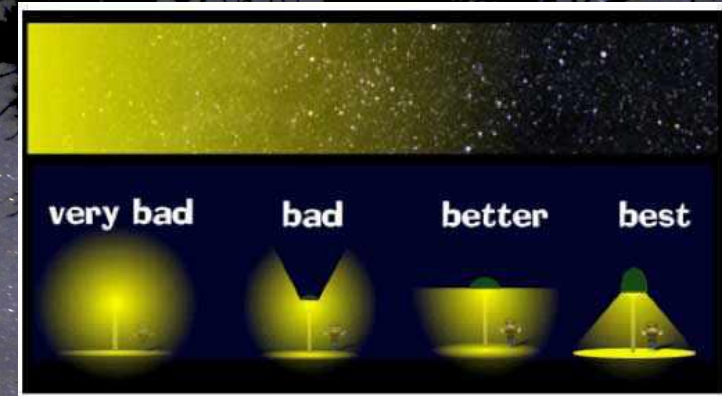


Outdoor Lighting Concepts

1. Light should go down only, not out or up
2. “Warm” colors ($<3000\text{K}$) are better than “cool” colors
3. Lighting should not be brighter or on longer than necessary



Health Effects of Light at Night

Growing evidence for harm to humans and wildlife of excessive/blue-rich light at night: **cancer, disruption of circadian rhythm, migration.**

Shift Work, Light-at-Night and Melatonin

CATEGORY*: IARC probable carcinogen

FOUND IN: Night shift workers

THE GIST: Women exposed to artificial light at night experience a higher incidence of breast cancer. Melatonin, a hormone that helps prevent tumor growth, produces high amounts of melatonin at night. In 2007, the International Agency for Research on Cancer (IARC) declared shift work "probably carcinogenic to humans," and the World Health Organization (WHO) declared light at night a "probable carcinogen."

www.breastcancerfund.org



Millions of birds killed/year



Animals confused, imperiled by LAN

Is more light always better?

“More light = less crime”? Not supported by evidence!

- Most dangerous US cities (Little Rock, Philadelphia, Newark) are all brightly lit.
- Cultural fear of “intruder hiding in the bushes,” but vast majority of rapes happen indoors, not outdoors.
- Burglars ignore presence or absence of “security lights”.
- Poorly designed, over-bright, unshielded lights cause deep shadows and glare – MORE dangerous, not less.

We don't need MORE lighting – we need BETTER lighting



Philadelphia

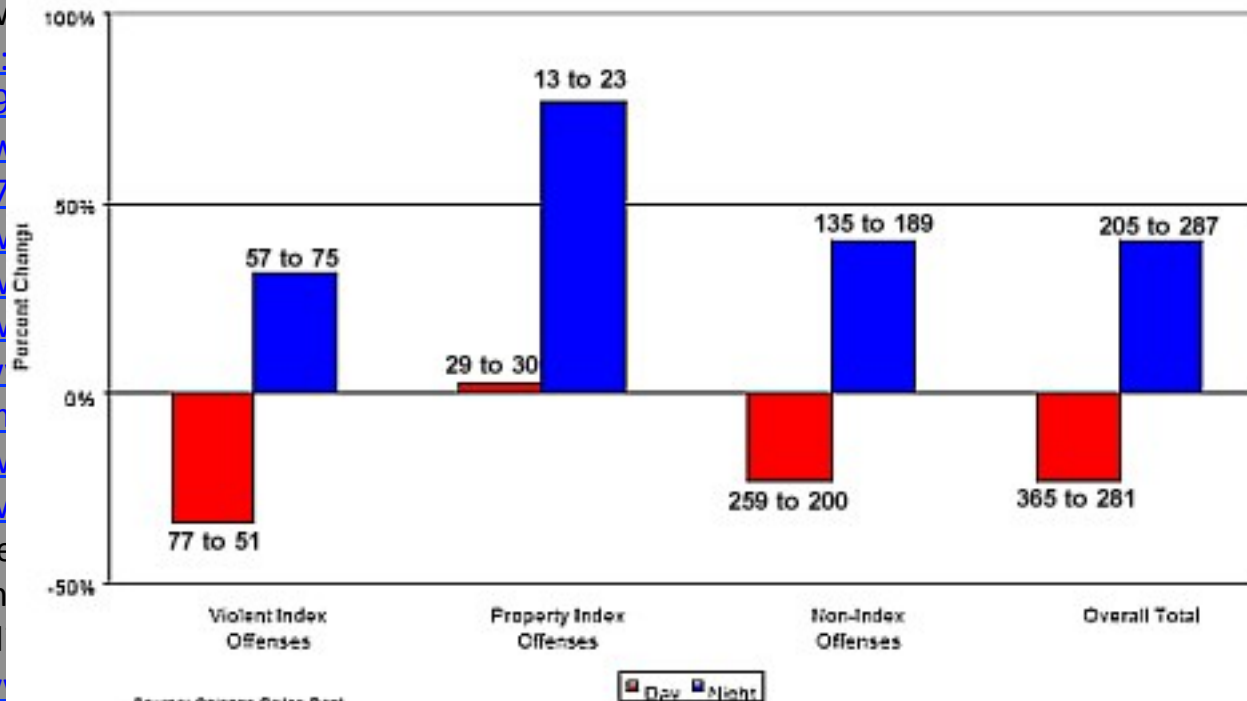


NEWARK - NEW JERSEY

Decades of studies find *no conclusive link* between lighting and crime

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- Other stud
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**Figure 10 - Change in Reported Incidents in Experimental Area:
Six Months Pre- and Post-Installation of Alley Lights
Day Versus Night Comparison - All Offenses**



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Everyone's favorite city with a lighting curfew?

Paris, France!



2012: overnight lighting of churches, museums, building facades, shop windows **banned**.

Plus:
Tucson, AZ
San Diego, CA
Riverside County, CA...

Midnight outside Fazzi & Associates:
Over-bright, over-blue LED lights,
Empty parking lot



3 foot-candles = 300x brighter than full moon!

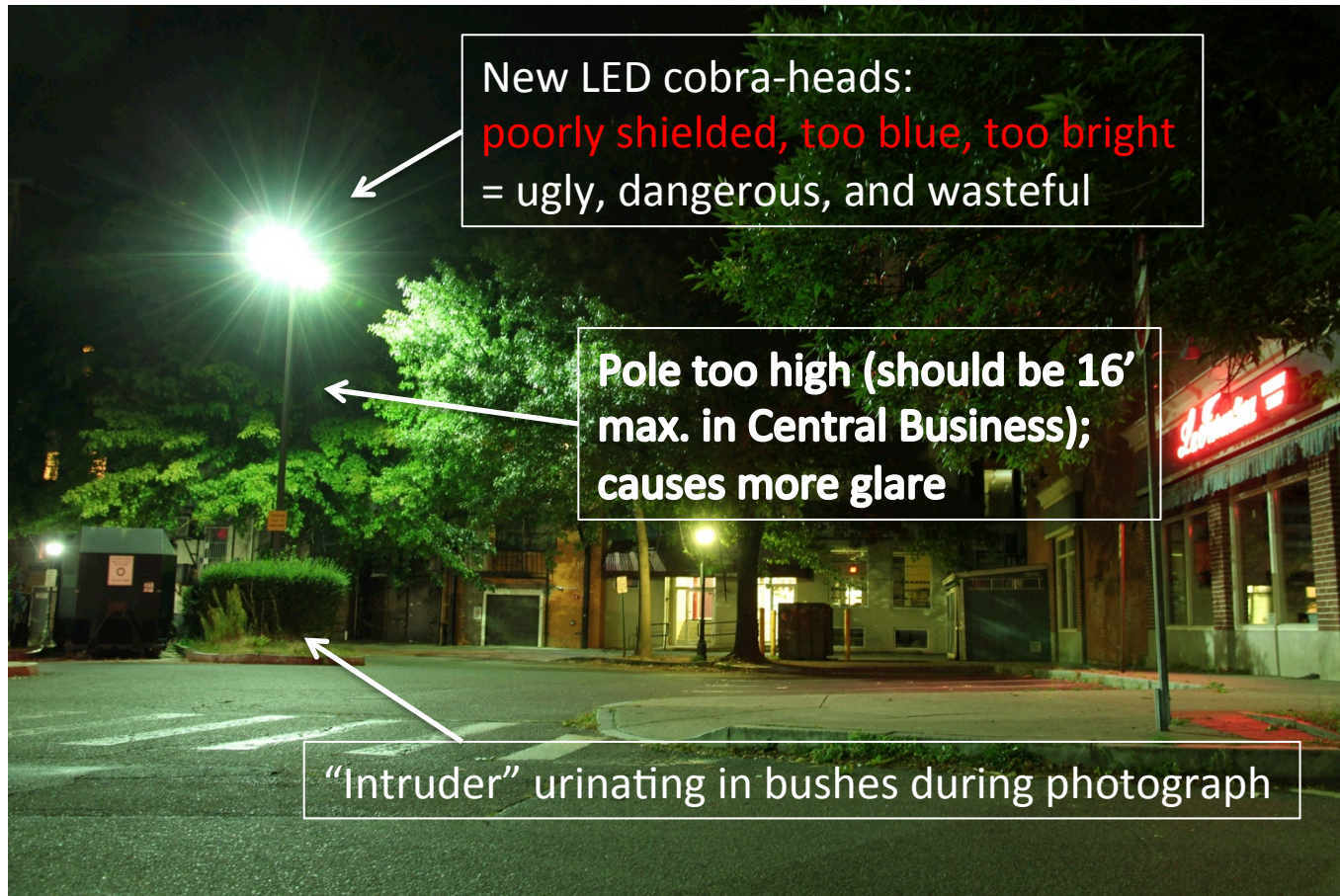
Parking lot of state office building, Prince St.:
unshielded, significant **glare**, **excessively bright** –
even at midnight with parking lot empty.



Compare with successful lighting curfew across Route 66:



Armory St. Parking Lot



New LED cobra-heads:
poorly shielded, too blue, too bright
= ugly, dangerous, and wasteful

**Pole too high (should be 16'
max. in Central Business);
causes more glare**

"Intruder" urinating in bushes during photograph

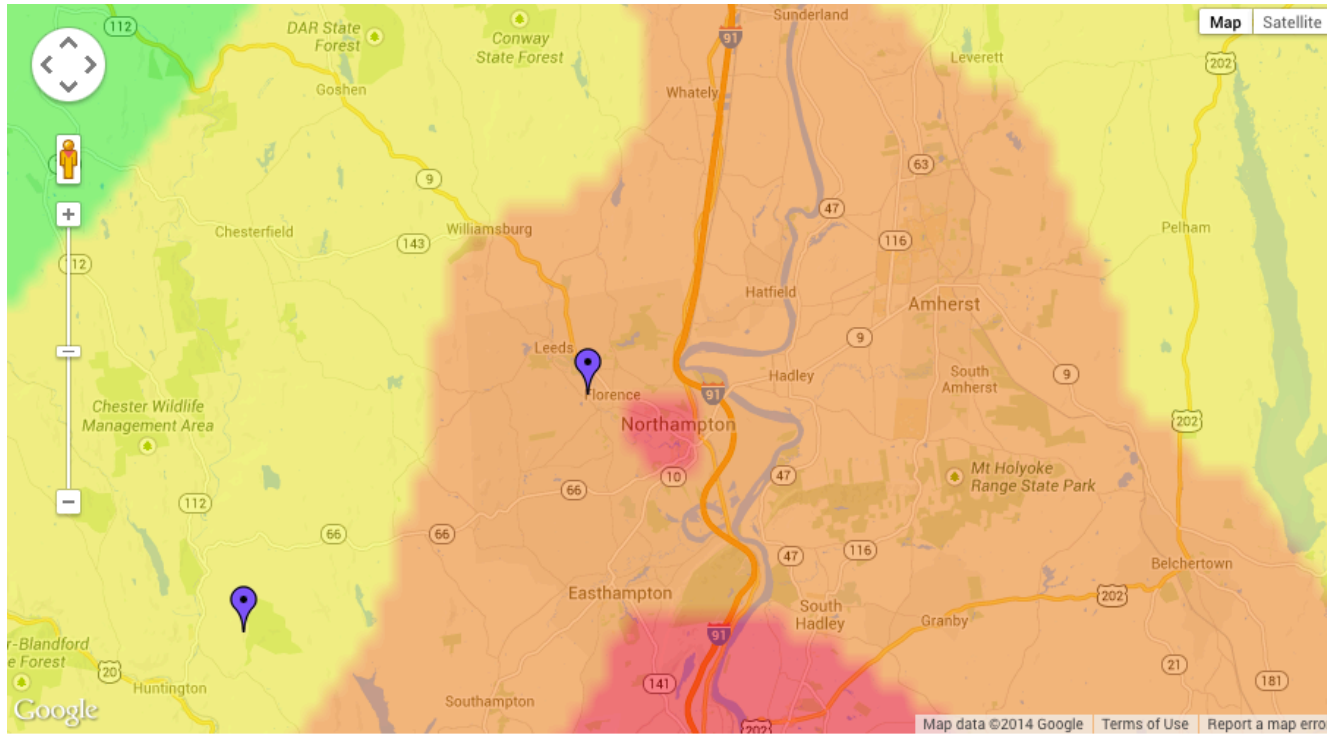
Lighting does not deter crime.

A curfew on outdoor lighting will...

1. save energy and money
2. **not** increase crime
3. protect public health
4. protect wildlife
5. protect the starry night sky

Thank you!

Effect of excessive and unshielded lighting



Map shows brightness of night sky

Northampton's night sky (Bortle scale 5)
is 10x brighter than natural dark sky conditions

Color Magnitude	Bortle Class	Sky Brightness mag/arcsec ²	
		Artifi./Natural	
7.6 - 8.0	1	>21.90	<0.01
7.1 - 7.5	2	21.90 - 21.50	0.01 - 0.11
6.6 - 7.0	3	21.50 - 21.30	0.11 - 0.33
6.3 - 6.5	4	21.30 - 20.80	0.33 - 1.00
6.1 - 6.3	4.5	20.80 - 20.10	1.00 - 3.00
5.6 - 6.0	5	21.1 - 19.10	3.00 - 9.00
5.0 - 5.5	6,7	19.1 - 18.00	9.00 - 27.0
<4.5	8,9	<18.00	>27.0

Northampton Police Station

Acorn-style post-top lights: **Completely unshielded;**
excessive glare and uplighting; not compliant with code



Shorter exposure to show luminaires

Note: retrofitting with LEDs inside existing acorn-style globes will still cause excessive glare and uplighting, will still be non-compliant.

Northampton Police Station (cont.)

Bad: completely unshielded; not compliant with code



Suggested Alternatives

Parkway & Square™



Arts & Crafts®



Civic Lantern™



Federal Globe™



Promenade™ Series



Providence® Family



Towne Commons®



Dundee



3. Replace existing acorn-style globe luminaires with new antique-style open-body fixture + down-facing LED. Promenade model shown is available with 31W, amber/2200K/3000K LEDs.

Architectural Area Lighting
(1 example of many;
see IDA FSA)

Most people prefer lighting that is “warm” (3000 K or less), well-shielded, not too bright




Davis, CA: “There were so many complaints about the brightness, the color, and the glare of the new LED streetlights that the city halted the project until a solution could be reached”.
Test: citizens prefer lights with “warmer” color (< 3000K).

-- kcra.com, 8/19/14

International Dark Sky Association (IDA) will no longer approve lights with CCT > 3000K

FSA SEARCH FORM

 INTERNATIONAL DARK-SKY ASSOCIATION
APPROVED DARK SKY FRIENDLY FIXTURE
www.darksky.org

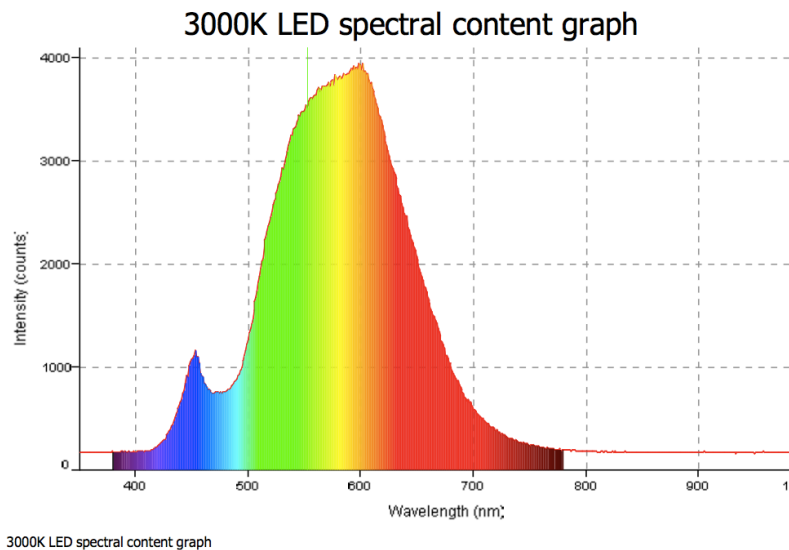
• FSA SEARCH FORM (CHECK ALL THAT APPLY)

Manufacturer

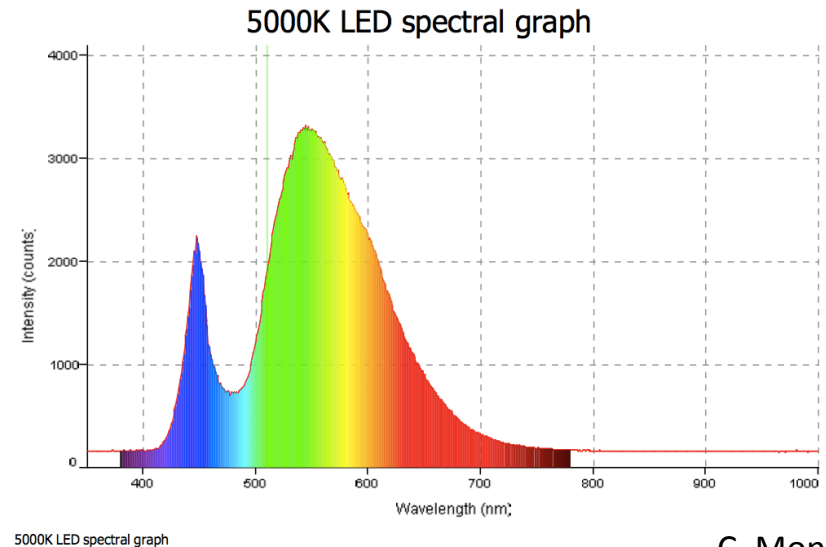
Source Type

- ☐ LED
- ☐ CFL
- ☐ HPS
- ☐ LPS
- ☐ MH
- ☐ Induction
- ☐ Plasma

Color temperature should be <3000K ("warm white", not "cool white")



Mostly yellow/red

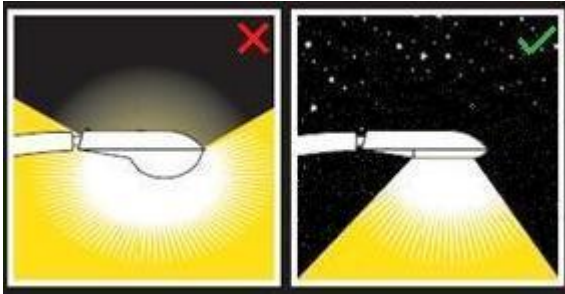


Mostly green/yellow,
with strong blue peak

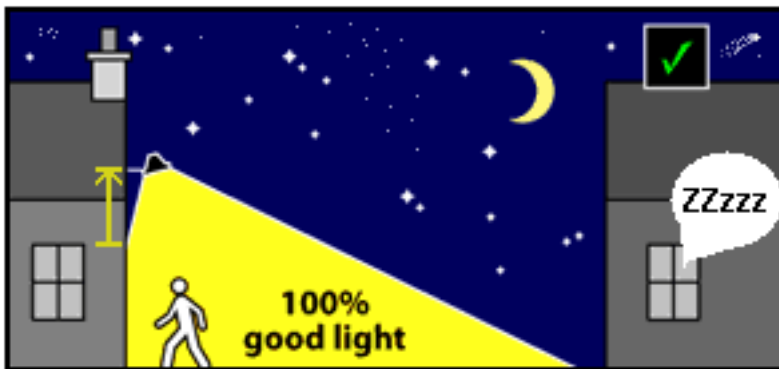
C. Monrad

1. Blue light causes more glare in human eye, ruins night vision (safety issue)
2. 30% of downlighting reflects from roads, buildings, and land back into sky, and....
3. ...blue light scatters much more strongly in air, so blue-rich LEDs cause **3-5x more light pollution** than high-pressure sodium, even fully-shielded.

Light should go down only (shielded), not out or up (unshielded)



BADLY AIMED 500W HALOGEN FLOODLIGHT



WELL AIMED 100W FLOODLIGHT

